

2.8 ABSOLUTE VALUE FUNCTIONS

$$y = a|x-h| + k$$

* graph has vertex (h, k) $\frac{1}{2}$ is symmetric
 ↑ ↑
 change keep
 sign sign

* V-shaped

① opens up if $a > 0$

② opens down if $a < 0$

* Compared to $y = |x|$:

① wider if $|a| < 1$

② narrower if $|a| > 1$

③ same if $|a| = 1$

① Identify vertex

② graph opens up or down

③ graph is wider, narrower, or the same as $y = |x|$

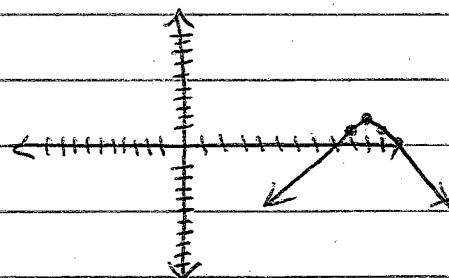
$$y = a|x-h| + k$$

Ex 1 $y = -|x-10| + 2$

vertex (h, k) , so $(10, 2)$

$a = -1 < 0$ so opens down

$|a| = |-1| = 1$ so same width



$$y = -|9-10| + 2$$

$$y = -1 + 2$$

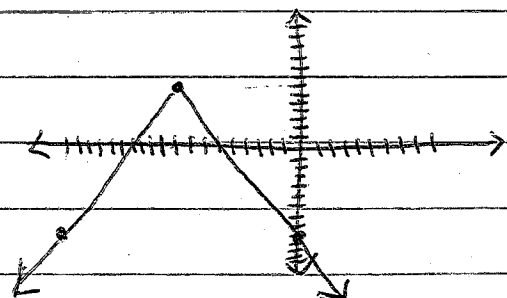
$$y = 1 \quad (9, 1)$$

Ex 2 $y = -2|x+9| - 7$

vertex $(-9, -7)$

$a = -2 < 0$ so opens down

$|a| = |-2| = 2 > 1$ narrower



$$y = -2|0+9| - 7$$

$$y = -2-7$$

$$y = -9 \quad (0, -9)$$